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ABSTRACT

Japanese education, including preservice teacher education, is incorporating instructional technology as an effective, systematic way to enhance planning, teaching, and learning. Japanese researchers developed a framework for using instructional technology to develop lesson plans for autonomous learning. Preservice teachers in Japan tend to hold rigid images of teaching from their own schooling experiences, and in the beginning stages of instructional design, then tend to refer to such images to generate lesson plans. New types of software, such as PowerPoint, provide ways for preservice teachers to express ideas in a flexible manner and revise them with ease. Repeated revisions enable them to refine their ideas and make them relevant to instructional events observed during teaching. The design procedure proposed here consists of four components: images, concepts related to each other by graphic representation, models, and propositions (ICMP). These components form the sequential steps in the ICMP method of instructional design and analysis. This paper describes how the framework was used in a preservice course on instructional technology. The instructor used PowerPoint for lesson planning and presentation, though students did not use any information technology. (SM)

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Image, Concept, Model and Proposition for Instructional Designing and its Application in Pre-service Education

- A framework to generate lesson plan for autonomous learning using IT -

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Japanese education is struggling to renovate the teaching style from cramming knowledge to activating curiosity and interest for students to explore knowledge and express themselves. Japanese teachers usually develop lesson plans referring to theoretical literature, teachers' guides, textbooks and educational goals described in the National Course of Study issued by the Ministry of Education, Science and Sports (Monbusho). They try to predict learners' activities in a class, develop instructional materials, provide learning environment, select tools for effective learning, support students' learning and then expect to achieve instructional goals. Instructional technology provides a systematic and professional procedure to optimize various components of instruction to achieve the goals. This developing procedure is expected to be rational and effective.

Researchers propose models to apply scientific knowledge to solve problems in teaching/learning and teachers at work adopt them to improve their teaching. Many models have been proposed to make this procedure rational and effective to achieve predetermined educational goals and instructional objectives. However, the unilateral application from theory to practice is not always effective in the complicated real situation. Teachers have to develop their own framework to confirm applicability of their knowledge accumulated from previous experiences in other different situations. In this circumstance, they have to equip themselves with competency to originate practical knowledge suitable to solve problems tackled in their work place. Teachers share strong feeling of ineffectiveness of instructional theory taught in the teacher education, especially pre-service education. Experienced teachers nominated by the Local Board of Education in each school district supervise novice teachers and give them advice on teaching in the first year of their professional careers. Nevertheless novice teachers heavily rely on their individual experiences and share them with colleague only occasionally. This procedure reproduces empirical consistency and professional continuity in successive generations among teachers. It is hard to change the framework of writing lesson plans in the conventional style and introduce a new concept of instruction. It is indispensable to develop a new style of lesson plan that enables teachers to express idea in very primitive state and revise it repeatedly to

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reach the refined lesson plan.

A Framework for Generating Lesson Plan

Pre-service students have long history of attending classes in elementary and secondary schools and hold rigid and sustaining images on teaching from their preceding experience. At the initial stage of instructional designing, they tend to refer to such images and follow the experienced framework to generate lesson plan. It is hard for students to change the framework and accept new types of instruction written in the form of conventional style of lesson plan. New types of software such as PowerPoint provide us to express ideas in flexible way and revise them with ease. Repetitive revisions enable us to refine ideas and make them relevant to instructional events observed in the real teaching. In this context, components used to describe a lesson plan should be flexible to change its structure at the very early stage of designing.

Theoretical framework functions to synthesize knowledge that is driven from practical experiences in teaching, applicable to various teaching situations and exportable to other teachers. The designing procedure proposed here consists of four components; images, concepts related each other by graphic representation, models and propositions, which form sequential steps shown in the following and is named ICMP Method for instructional design and analysis.

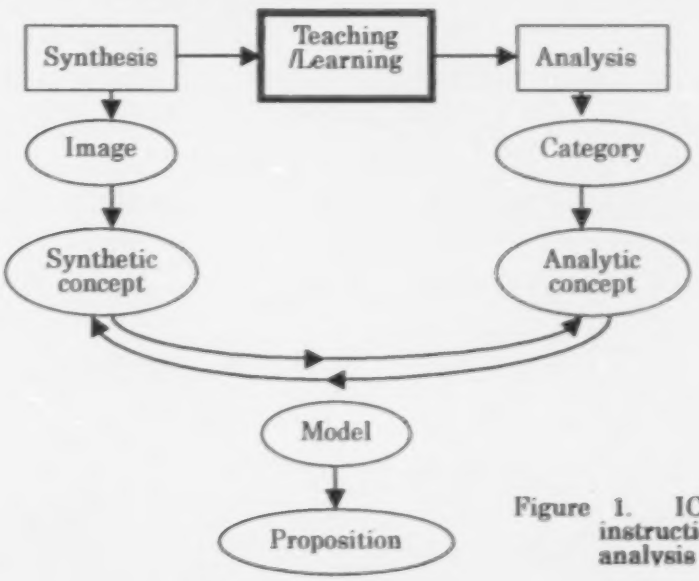


Figure 1. ICMP Method for instructional design and analysis

In the conventional lesson plan, students as pre-service teachers in teaching practice have to describe their view on educational goals, instructional contents and perception on children. They have very restricted images and poor perspectives of instructional contents and learners' background at the initial moment. They need to express their ideas on a lesson plan in primitive way and revise them gradually along with proceeding and

developing the lesson plan. In this procedure, PowerPoint is very convenient to modify their initial ideas and revise the plan.

In-service teachers also face to the similar situation mentioned above, and start to describe their ideas in written form when they try to introduce a new type of instruction. In the conventional lesson plan, we describe instructional aims and goals, teacher's activities, learners' activities, teaching materials and other remarks. It is easy to express their ideas as expectation and philosophical view, but hard to describe instructional events to occur in the teaching process in advance. They don't have a whole view on teaching at the beginning, start with very limited perspective and extend it gradually. Descriptions in written form are easy to read, but difficult to modify and revise. Keywords and graphic representations for instructional designing facilitate teachers to develop their ideas and revise them repeatedly. This revising procedure is vital to improve the initial lesson plan and refer to the actual situation to be observed in the class. My proposal aims to give them a new framework to initiate instruction inexperienced in daily teaching. They start writing lesson plan in very primitive way using pictorial images. They proceed to the stage of keywords or concepts and describe ideas in graphic representation. This framework was applied to my teaching on 'Instructional Technology' at Bukkyo University in 1999 and 2000 and approved functional in the conventional class, in which instructor use PowerPoint to design the lesson, but students do not use any information technology but pieces of paper.

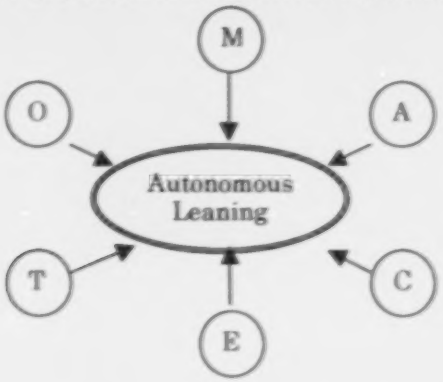
Implementation of ICMP Method in Pre-service Education

The following is characteristics of the course of 'Instructional Technology' applied of ICMP Method to design lesson plan.

Subject: 'Instructional technology'
Attendants: 224 students, mainly sophomores
Session: 12 sessions at 5th session (16:10 – 17:40) on Friday
Classroom: Four tables of four seats per row, 30 rows
Facilities: Ordinary blackboard, microphone and two wide walls for presentation
Supporter: Two teaching assistants
Equipment: A notebook-type computer and one portable projector used by instructor
Tools: 'Microsoft PowerPoint' for lesson plan and presentation used by instructor
'Microsoft Word' for handouts and printed materials used by instructor
Pieces of paper and two-hold paper panels to keep the pieces of paper for students

PowerPoint slides in Appendix shows images and models. The section II shows a tree structure of concepts and the section III some examples of propositions. The model for autonomous learning is named MACETO representing meaning, activities, contents, environment, tools and outcome as shown in the following figure. Each component has

items arranged in tree-structure as shown as variables of MACETO in the Appendix.



M: meaning
A: activities
C: contents
E: environment
T: tools
O: outcomes

Figure 2. MACETO model for autonomous learning

Students were requested to submit reports of 10 pages at the end of course, of which themes are given in the early stage of the course as follows.

1. To describe an imaginary school including images and models which are developed in group work and develop it further according to your own idea. Explain your rationale to establish such school referring to documents issued by the Ministry of Education (Monbusho) and/or Local Boards of Education and literature on education, and evaluate your plan of the school.
2. To make a lesson plan for conducting a demonstration session in which children explain the characteristics of their school to children in other schools in the district. In this occasion, develop the lesson plan using images and models and referring to MACETO model to select synthetic concepts. The plan should be relevant to children's activities and learning situations and environment.
3. To report your own learning during the course and evaluate it referring to 'Learning plan of this week' sheets.

Students worked hard and collaboratively in-group and individually to accomplish these themes. At the beginning of every session, two sheets of 'Topics of this week' and 'Learning plan of this week' are distributed. Students have to fill in 'Learning plan of this week' and submit it at the end of each session. The lesson was conducted by showing lesson plan of this course through PowerPoint presentation and handouts of 'Learning plan of this week'. Some examples of slides are shown in Figure 1 in the Appendix.

Slide 1: Image representing whole course showing students ambiguous states at the beginning, gradual clarification and final presentation and report.

Slide 2: Picture explaining whole process of the course. It intends to give students perspectives of the course.

Slide 3: Physical configuration of the classroom with 30 rows of 4 fixed tables of 4 seats and its conceptual model.

Slide 4: ICMP Method for synthesis and analysis of teaching/learning process.

Slide 5: Examples of models.

Slide 6: MACETO model utilized in this course for autonomous learning.

Slide 7: Typical two models showing communication oriented group work and outcome oriented group work.

Slide 8: 36 groups representing each school and forming 6 school districts.

Slide 9: Model showing poster session organized by each school district to share ideas.

Slide 10: Picture to explain technological creation and function of model in its process. Model for outcome oriented group work.

Slide 11: Picture to explain technological creation and function of model in its process. Model for poster session in a school district.

Slide 12: A model for school education composed of four major factors of philosophy/ expectation, teachers' competency, educational reality and constrains.

In this course, students did not use any technological devices, but only small sheets of paper and panels made of A3 size paper. About 86 percent of 224 students in average attended the session and participated actively in-group work during the spring semester.

Conclusion

The course can be described in the form of images, concepts, models and propositions that are exportable to professional teachers through Internet or other communication technology and enable them to share professional experiences on teaching. There is no clear cut between image and model, but the image represents teachers' idea and expectation, on the other hand the model represents teaching and learning events observed in actual class in the form of conceptual figures and concepts. Synthetic concepts are driven from images and intention-oriented, on the other hand analytic concepts driven from analysis of teaching/learning process and behavior-oriented. There is no continuous and reliable procedure to convert the lesson plan from concepts to models. It requires intuitive ideas and back and forth repetitions to refine the lesson plan. If we succeed to standardize symbols and concepts internationally, it is possible to share our teaching experiences in each country.

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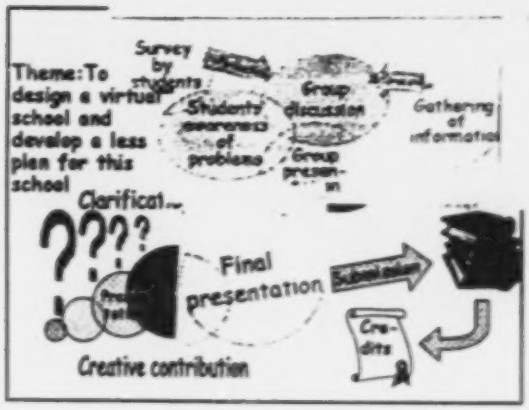

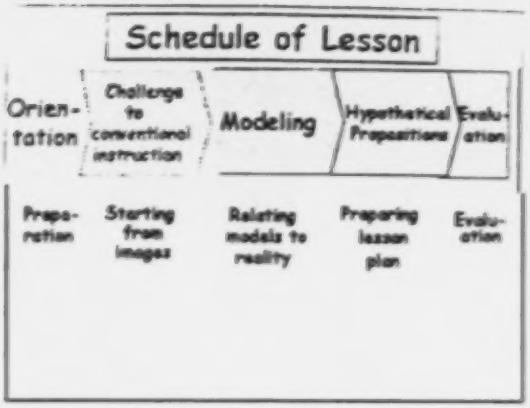

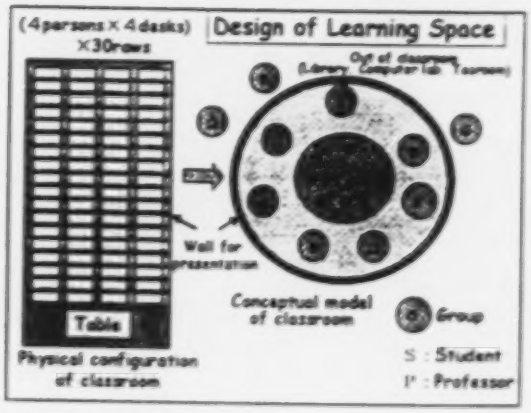

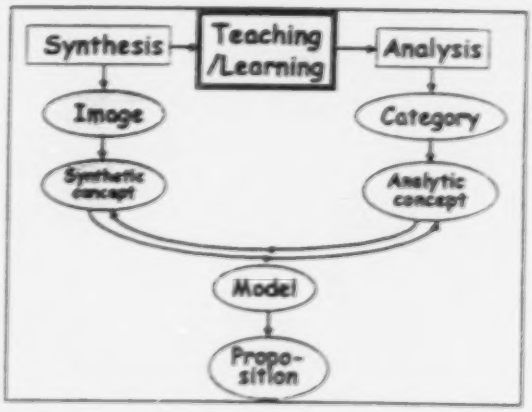

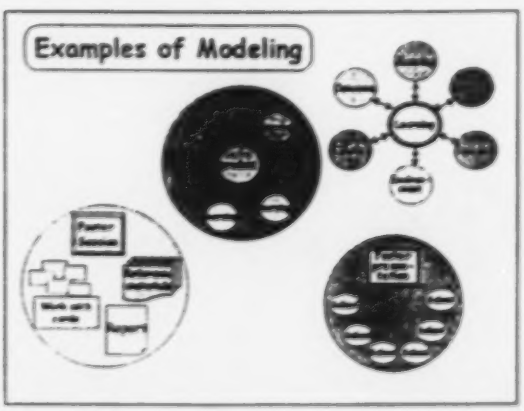

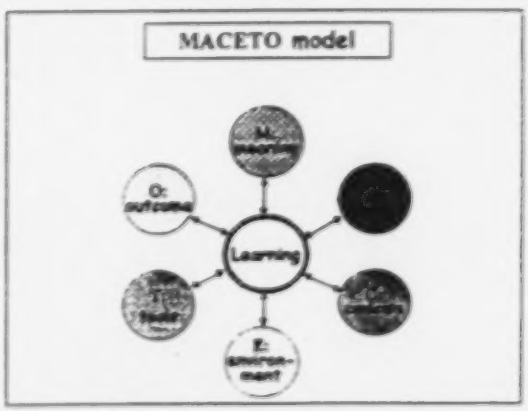

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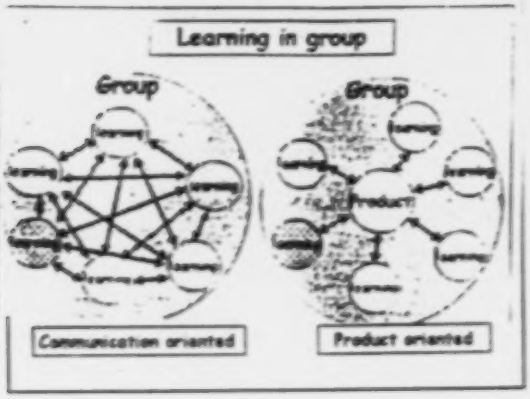

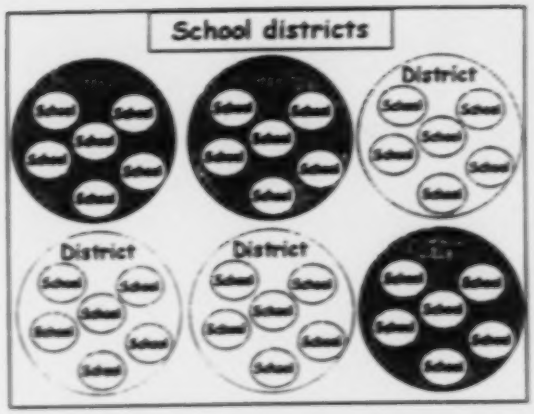

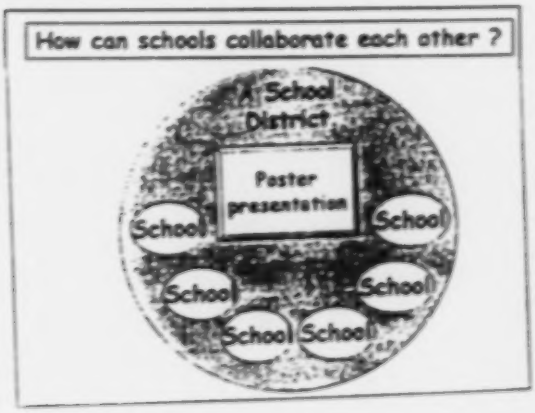

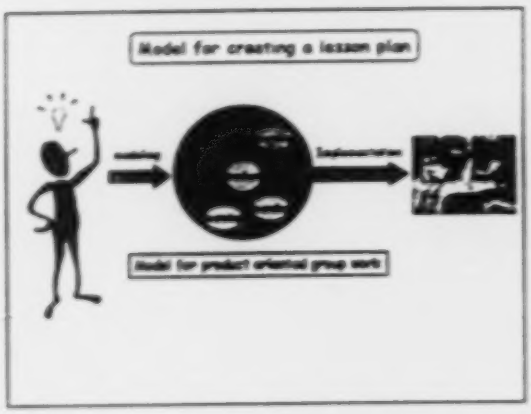

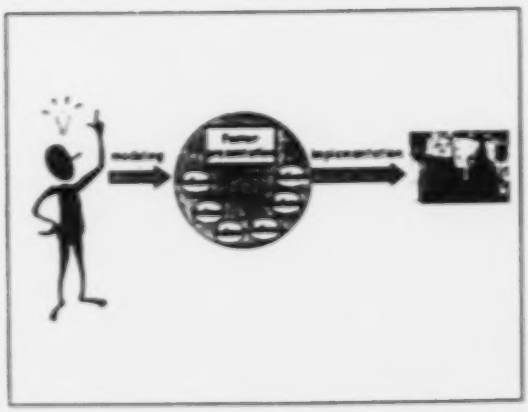

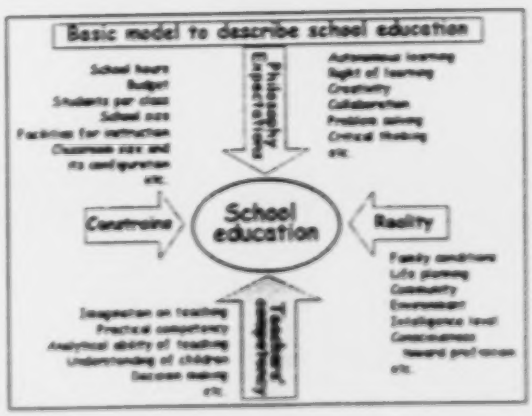

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Appendix

I. Images and models for instructional designing using PowerPoint

Slides of PowerPoint

II. Tentative list of concepts/keywords to design lesson in the form of MACETO

Variables of MACETO

1. Meaning
   - 1.1 Contextual/situational
     - 1.1.1 Interest and inquiry to subject matters
     - 1.1.2 Cultural interest and inquiry
     - 1.1.3 Self-recognition through learning and achievement
     - 1.1.4 Social recognition through learning
     - 1.1.5 Experiences from past
   - 1.2 Awareness of problems
     - 1.2.1 Social problem: economy, environment, social welfare, information, health
     - 1.2.2 International problem: peace, poverty, development, education
     - 1.2.3 Community problems
     - 1.2.4 Personal problems
   - 1.3 Preparation for future
     - 1.3.1 Preparation for entrance examination
     - 1.3.2 Acquisition of certificates
     - 1.3.3 Preparation for specific profession
   - 1.4 Self cultivation
     - 1.4.1 Acquisition of professional competency
     - 1.4.2 Improvement of professional competency
     - 1.4.3 Acquisition of special knowledge/skills

2. Activities & Actions
   - 2.1 Learning activities
     - 2.1.1 To collect information
       - 2.1.1.1 To listen to
       - 2.1.1.2 To conduct survey
     - 2.1.2 To process information
       - 2.1.2.1 To interpret
       - 2.1.2.2 To calculate
       - 2.1.2.3 To respond/answer
     - 2.1.3 To deepen/
       - 2.1.3.1 To discuss
         - 2.1.3.1.1 To discuss in group : in small group, in class
         - 2.1.3.1.2 To discuss through telecommunication technology : E-mail, Tele-conferencing
         - 2.1.3.1.3 To discuss on papers
       - 2.1.3.2 To repeat practices
     - 2.1.4 To express oneself
       - 2.1.4.1 To report
       - 2.1.4.2 To present
       - 2.1.4.3 To produce outcomes
     - 2.1.5 To conceptualize
       - 2.1.5.1 To express in model
       - 2.1.5.2 To make abstract
       - 2.1.5.3 To simulate
3. Contents
   - 3.1 Subject matters (differ from country to country)
     (Omitted)

4. Environment
   - 4.1 Physical environment
     - 4.1.1 Facilities: classroom, laboratory, athletic field, desks, chairs
     - 4.1.2 Equipment: printer, copier, experimental equipment, computer, AV equipment
   - 4.2 Psychological environment
     - 4.2.1 Configuration: friends, teachers, family, people in community, children in other schools, teachers in other schools
     - 4.2.2 Relationship: mutually confident, open, persuasive, friendly, constructively critical, negatively critical

4.3 Information environment
4.3.1 Enlightening information: books, document, literature
4.3.2 Networked information: Internet, telephone
4.3.3 Authoritative information: teachers' professional, expertise in community, beaurocrats
4.3.4 Homogeneous information: schoolmate,

5. Tools
5.1 Construction/reconstruction
5.1.1 Small sheets of paper, cards, notebook, pencil and eraser
5.1.2 Editing function of software: word-processor, spreadsheet
5.1.3 Constructive software: HYPER-CARD, INSPIRATION
5.2 Data processing
5.2.1 Electronic calculator, spreadsheet
5.3 Recording
5.3.1 Notebook, workbook, tape recorder
5.4 Communication
5.4.1 Internet, facsimile telephone, letters
5.5 Presentation
5.5.1 OHP、PowerPoint, presentation software
5.5.2 Speaker, microphone, Video camera, display

6. Outcome
6.1 Competency
6.1.1 Teacher education
(Omitted below)
6.1.2 High school education
(Omitted below)
6.1.3 Middle school education
(Omitted below)
6.1.4 Elementary school education
(Omitted below)
6.1.5 Professional certificate
(Omitted below)
6.2 Product/
6.2.1 Test
6.2.2 Notebook, workbook
6.2.3 Report
6.2.4 Thesis
6.2.5 Work
6.3 Evaluation - aims
6.3.1 Self-evaluation
6.3.2 Formative evaluation
6.3.3 Diagnostic evaluation
6.3.4 Summative evaluation
6.4 Evaluation - method
6.4.1 Objective testing
6.4.2 Descriptive testing
6.4.3 Behavior observation
6.4.4 Evaluation of works

III. Instructional propositions applied to this course.

- It is possible to develop students' competency for instructional designing through a sequence of training to form pictorial images, key concepts, graphic representations, modeling and hypothetical propositions.
- Alternative strategies for degree of freedom in learning
  1. When we increase the degree of freedom in learning and give more initiative to students, learning results in a wide range from excellent to poor outcomes in quality and quantity.
  2. When we decrease the degree of freedom in learning and give less initiative to students, learning results in reliable but mediocre outcomes of less excellent and less poor quality.
- When we feel conscious of gradual formation of outcomes within ourselves, we realize the meaning of learning.
- Transformation from image to key concept, to graphic presentation and to model is

indispensable but hard to achieve this transformation successively. Modeling requires a leap from the previous step.

- There are two possible ways to proceed to models.
  1. Students observe recorded teaching, take notes on it and analyze it. After this analysis, they try to describe its process in keywords and relate them in a graphic representation.
  2. Students repeat to describe their own experiences in keywords and show the activities in a graphic representation, and succeed to express relationship and procedure in a model.
- Realization of autonomous learning requires cultivating students' attitude of learning. To cultivate such attitude, it is effective to require repeatedly the same behavior of filling the framework sheet (MACETO format) for students to be able to organize learning by themselves.
- To recover autonomous learning, it is effective to concentrate to develop a lesson plan dominated by activities, rather than plan dominated by contents of subject matters.
- To manage a large group of students to learn autonomously, it is effective to form groups and clusters of groups, encourage active participation and let them recognize their responsibility of autonomous learning.
- To initiate a project for group work, it is effective to start from image building. In this situation, it is effective to develop abstract images using concepts and graphics in order to revise them with ease.
- To make learning meaningful, it is effective to start the lesson from earlier experiences relevant to instructional contents.

(Other 18 propositions are omitted)

References

NISHINOSONO, Haruo() 'Two symbol systems for instructional design'

I appreciate your comments and suggestions on my work. Please describe your opinion in this sheet and hand it back to me during this meeting. Thank you

Name _____ Affiliation _____E-mail_____

Comments and/or suggestions: